Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems	)	CC Docket No. 94-102

To: Chief, Wireless Telecommunications Bureau

COMMENTS OF TRUEPOSITION, INC.

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SUMMARY

The underlying purpose of the Commission's Phase II Enhanced 9-1-1 rules is to enhance public safety and save lives, but the June 1, 1999 Public Notice departs from this long-standing focus. Network-based technology is available today that meets, and in some cases exceeds, the Commission's accuracy and performance standards. Nonetheless, the Public Notice signals yet more delay in the delivery of Phase II Automatic Location identification ("ALI") as the Bureau seeks evidence of how well handset-based technology could perform and at what rate ALI-enabled handsets will reach the public.

Specifically, the Public Notice solicits further comment on the issues of handset churn and roaming. Although most waiver proponents suggest that ordinary handset churn and standardization processes will ensure that all but a tiny percentage of a carrier's subscribers and roamers have compatible ALI-enabled phones within a few short years, there is no support in the record for this conclusion. To the contrary, the credible evidence in the record supports the conclusion that handset churn cannot overcome the inability of handset-based ALI technologies to locate the embedded CMRS subscriber base.

The Public Notice also requests comment on proposals to change the degree of accuracy with which CMRS carriers must locate 911 callers. To change

the standard now merely because proponents of alternative, yet unproven, technologies cannot comply with the existing standard would be inexcusable. The proposals of SnapTrack, APCO and the other waiver proponents offer no improvements over the accuracy already demonstrated by TruePosition and other network-based E911 providers.

Accordingly, the pending waiver requests do not satisfy the Commission's standards for granting waivers or for watering down the rules' existing public safety requirements.

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COMMENTS OF TRUEPOSITION, INC.

TruePosition, Inc. ("TruePosition"), by its attorneys, hereby submits its comments in response to the June 1, 1999 Public Notice released by the Wireless Telecommunications Bureau ("Bureau") in the above-captioned proceeding.[1] The Public Notice seeks "targeted" comments principally on two waiver proposals submitted by SnapTrack, Inc. ("SnapTrack") and the Association of Public-Safety Communications Officials-International, Inc. ("APCO"). These proposals request that, subject to certain guidelines, the Commission permit commercial mobile radio service ("CMRS") carriers to meet their E911 Phase II obligations by "phasing in"

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[1] "Wireless Telecommunications Bureau Requests Targeted Comment on Wireless E911 Phase II Automatic Location Identification Requirements," DA 99-1049, Public Notice, released June 1, 1999 (hereafter "June 1 Public Notice").

E911 coverage through the sale of ALI-enabled handsets, which are not yet available and have not been proven commercially viable.

The Public Notice signals a stark and unwarranted turnaround from the Commission's public interest findings in this proceeding. Rather than reaffirming the Phase II rules and encouraging the implementation of available and effective E911 location technologies, as the Commission has previously done, the Public Notice suggests there will be yet more delay in the delivery of Phase II ALI. The need for additional comments just five months after an earlier notice inviting requests for waivers of the Phase II rules is ample evidence that the record does not support waivers. Far from establishing the imminent availability of handset-based ALI solutions, the record reflects nothing more than assertions by non-manufacturers that ALI-equipped handsets will be available sometime within the next two years.

Moreover, the issues raised in the Public Notice are a potentially dangerous distraction from the Commission's five-year-old E911 agenda. As recently emphasized by the National Emergency Number Association ("NENA"),[2] the nation's leading 911 public safety agency, the issue is and always has been public safety. TruePosition concurs with NENA, which has urged the participants in this proceeding to set aside the current technological debate and return the collective

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[2] See Comments of National Emergency Number Association ("NENA"), filed June 10, 1999.

focus back to the issues and requirements of public safety. To do so, the Bureau must ask whether the grant of waivers or rule changes would save or cost lives. Given the serious questions still surrounding the timing and ultimate viability of handset-based ALI approaches and the volume of non-ALI-equipped CMRS handsets that will remain in circulation even if one or more handset-based ALI approaches were to prove viable in the next two years, grant of the instant waiver requests or comparable rules changes would certainly jeopardize American lives.

The Commission has long recognized the inherent risk in rewriting the rules to benefit any particular technology. The Commission stated in its *E911 Reconsideration Order* that "considering the importance of providing location information during emergencies and the passage of time since the establishment of PCS and the initiation of the E911 proceeding, we determine that the five-year implementation schedule should not be delayed any longer and we urge the PCS industry and other wireless digital system providers to continue their efforts to comply with the Rules."[3] The Commission "encouraged the wireless carriers, equipment manufacturers, and the location technology vendors to continue their

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[3] Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems, Memorandum Opinion and Order, 12 FCC Rcd 22665, at ¶ 122 (1997) ("E911 Reconsideration Order").

efforts to deploy ALI technologies for digital wireless systems as scheduled, rather than asking for delays so far in advance."[4]

Notwithstanding these admonitions, and notwithstanding the Commission's apparent frustration with the slow pace of Phase I implementation,[5] almost two years after the *E911 Reconsideration Order* later we are again faced with the prospect of further delay rather than enforcement of the rules the Commission has *twice* found in the public interest. Nonetheless, since the Public Notice requests further comment on specific issues, TruePosition herein offers this response.

A. Handset Churn Will Not Enable Carriers Deploying Handset-Based ALI Approaches to Locate Roamers or the Embedded CMRS Subscriber Base for Many Years

In the *E911 Reconsideration Order* the Commission "reaffirm[ed] our commitment to the rapid implementation of the technologies needed to bring emergency assistance to wireless callers throughout the United States."[6] The

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4 Id. at ¶ 122. In the *E911 Reconsideration Order*, the Commission also emphasized that "setting a firm date will encourage entrepreneurial efforts and investments to serve [the E911] market." Id. at ¶ 120. This approach has worked. TruePosition and other network-based vendors have developed ALI solutions that can save lives now. After five years, however, handset-based technology vendors still have not.

5 See "Commission Seeks to Facilitate Wireless E911 Implementation and Requests a Report," Public Notice, CC Docket No. 94-102, released June 9, 1999.

6 E911 Reconsideration Order at ¶ 6.

Commission reiterated its conclusion "that the public interest would clearly be better served by requiring covered carriers to forward *all* 911 calls"[7] and emphasized that since many wireless 911 calls are made by "Good Samaritans" reporting accidents and emergencies to PSAPs, applying the Phase II ALI requirement to *all* 911 calls "primarily benefits the public and serves the public interest, not simply the interest of the caller."[8]

Despite the Commission's conclusion that public safety requires that *all* 911 callers should be protected by ALI, GPS proponents offer no guarantee of full coverage. Instead, most waiver proponents suggest that ordinary handset churn and standardization processes will ensure that all of a carrier's subscribers and roamers have compatible ALI-enabled phones within a few short years. To the contrary, under their own estimates tens of millions of users will not be protected for many years after the Phase II deadline.

The starting point for this discussion is the Commission's conclusion in the *E911 Reconsideration Order* that the "value of E911 ALI for emergency service providers would be quite different if the accuracy of 25 percent or 33 percent of all calls was ignored" or if there were "no location information at all" for such a

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7 Id. at ¶ 33.

8 Id. at ¶ 34.

high percentage of calls.[9] This, however, is exactly what SnapTrack, APCO and other waiver proponents propose. As described further in Section B below, under SnapTrack's proposed accuracy standard carriers could avoid locating one-third of all 911 calls. Moreover, handset-based ALI waivers or rule changes will leave most of the approximately 100 million CMRS users projected by October 2001 without ALI location protection for many years thereafter. Even with the most unrealistically aggressive assumptions regarding CMRS handset churn, under either SnapTrack's or APCO's proposals, in 1996 more than 39 million CMRS users (representing 26% of all subscribers) would still have phones that lacked ALI capability and could not be located.[10] See Exhibit A (Table 1 and Figure 1).

It is not surprising that the Bureau has concluded that the record still lacks credible evidence that handset churn can overcome the inability of handset-based ALI technologies to locate the embedded CMRS subscriber base or solve the "roamer problem."[11] There are numerous flaws in the waiver proponents' reliance on

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9 Id. at n.325.

10 In contrast, TruePosition's wireless location system can already locate *every* analog and TDMA handset used in the country – more than 60 million handsets – at accuracy levels that meet or exceed the existing rules and TruePosition will be deploying its first CDMA system in a real-world CMRS environment beginning next month.

11 Of course, the "roamer problem" inherent in handset-based E911 solutions, which the Public Notice also relates to handset churn, cannot be solved by

(continued...)

handset churn projections. The key flaw is their projected rate of handset churn. There is no hard data about the rate of handset churn. As a result, waiver proponents rely on a variety of historical subscriber churn rates as the basis for their projections of handset churn.

In fact, none of the waiver proposals or supporting comments contains anything more than a superficial analysis of the effect of handset churn on the embedded base of non-ALI-enabled handsets. A more detailed analysis, however, is set forth in the attached Exhibit A. This analysis is overly favorable to handset technologies because it accepts most of the assumptions that we demonstrate in this section are not supported by the factual record or logic. Even with all of these assumptions, the analysis demonstrates that at the end of 2004, *more than three years* after the Phase II deadline, approximately 31% of CMRS users (*i.e.*, almost 45 million users) would still be using non-ALI-enabled phones. Obviously, claims that the problem of ALI "have nots" will disappear in due course are unrealistic.[12]

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[11] (...continued)
churn alone. It is also dependent upon a completion of a standardization process that ensures locatability user with one type of GPS-equipped phone roams into the system of a carrier depending on a different type of GPS-equipped phone.

[12] When waiver proponents claim that, based upon "current replacement rates," between 95% and 98% of their customers will have ALI-enabled handsets by 2004 (e.g., Comments and Petition of AirTouch Communications, Inc. at 12 (continued...)

Of course, this best case scenario will never come to pass.[13] For example, like each of the waiver proposals, this scenario makes another crucial but unsubstantiated assumption: that manufacturers will include GPS location technology in all handsets once integration of such technology into handsets is feasible. No manufacturer has yet committed to production of *any* quantity of ALI-enabled phones, much less to make all its production ALI-enabled at any future date. If there are several competing GPS technologies in the marketplace, it would be in a manufacturer's economic interest to choose not to implement any GPS technology (or to do so only in a limited portion of its production) until it became clear which standard(s) would be adopted. Even if the GPS standards issues are resolved,[14] manu

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12 (...continued)
and Attachment 1, and Aerial Communications, Inc. Petition for Waiver at 6) the unstated calculation methodology is: 100 percent/percentage churned per year = approximate number of years for change-out. In short, their assumption apparently is that virtually every churned subscriber will always be a non-ALI handset owner rather than a previously churned subscriber already using an ALI handset. In Exhibit A, a different assumption is used – that the churn rate for ALI handset owners after the first year will begin to approximate that of non-ALI handset owners. Thus, the number of non-ALI phones going out of service in a given year is calculated by multiplying the number of non-ALI phones at the beginning of the year (X) by the percentage churn rate (Y). The number of non-ALI phones still in service at the end of the year equals (X-(XY)). See Exhibit A.

13 Without such assumptions the number of non-ALI-enabled handsets at any given point of time calculated in Exhibit A would be significantly higher.

14 As we have previously discussed, the standardization process is inevitably (continued...)

facturers will still have an incentive to continue producing lower cost, non-ALI-enabled versions of their phones because some carriers will have adopted network-based solutions.[15] So long as there is demand, manufacturers will always choose to produce a lower-cost, differentiated product, and customers will buy those lower cost phones. It would thus be arbitrary to assume that all handsets will be ALI-equipped in the future.

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[14] (...continued)
long and complicated and in this case would unreasonably delay availability of E911 to all wireless customers. True Position May 24, 1999 ex parte at 8. Indeed, handset-based ALI proponents have previously made projections that the standardization process would be nearly completed by now. Comments and Petition of AirTouch, filed Feb. 4, 1999, at 10; SnapTrack Comments, filed Feb. 25, 1999, at 11. Waiver proponents relying on the completion of standardization processes should be required to produce detailed projections on the content and timing of implementation from the standards organizations and manufacturers on whom the outcome of such processes depend.

[15] Many wireless carriers have not requested waivers, and most of those that have requested waivers have emphasized that they may still use a network solution. See, e.g., Advantage Cellular Systems, Inc. Request for Waiver, filed Feb. 4, 1999, at 2; Ameritech Request for Waiver, filed February 4, 1999, at 6 Indeed, several of the waiver proponents propose that they be able to rely on the existence of network-based solutions in competing CMRS systems to locate roamers or other non-locatable phones. See, e.g., Aerial Communications, Inc. Petition for Waiver, filed Feb. 5, 1999, at 7; AirTouch Communications, Inc. Comments and Petition for Waiver, filed Feb. 4, 1999, at 14.

Finally, as TruePosition has stated previously, churn rates will not likely continue at today's levels.[16] Many CMRS users in the last two years have switched from analog cellular carriers to digital providers because of the smaller, lighter, digital phones and competitive rate plans offered by the newer PCS and other digital service providers. By late 2001, the effect of this "migration" to new light-weight digital handsets and PCS rate plans is likely to decline. In addition, the Commission's *E911 Stronger Signal Order*[17] will result in the availability over the next two years of newly equipped stronger signal phones. It is simply not plausible to assume that all (or even many) of the users who buy these phones by 2001 will then quickly trade them in again. Similarly, although most CMRS users buy new phones when they switch carriers, the correlation is not one-to-one. Indeed, the frequency with which a customer changes carriers but does not buy a new phone should increase with the proliferation of dual-mode and tri-mode phones that work on networks with different transmission standards.

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16 TruePosition Response to E911 Comments and Waiver Requests, filed Feb. 16, 1999, at 18.

17 In re Revision of the Commission's rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems, Second Report and Order, released June 9, 1999.

In short, churn rates will not solve the problems inherent in any handset-based approach to locating roamers or the embedded CMRS base.[18]

B. The Commission Carefully Considered and Rejected Less Protective Methods of Measuring ALI Accuracy

The significance of locating every 911 caller is not the only aspect of the Commission's E911 regulatory scheme that has been lost in the recent waiver debate. Waiver proponents are also seeking lower standards for measuring accuracy, a request that is impossible to square with their suggestion that a GPS solution will offer more accurate location of wireless 911 callers.[19]

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[18] Suggestions that a fallback to the Commission's Phase I standard (see, e.g., IDC Ex Parte at 3 (March 24, 1999)) or some other standard substantially less than 125 meters RMS (see, e.g., Sprint Spectrum Waiver Request at 5) is somehow sufficient for locating roamers are contrary to the Commission's previous public interest findings. E911 Reconsideration Order at ¶¶ 126-29. Moreover, while carriers that adopt handset-based solutions can take steps (such as undertaking educational programs and/or offering financial incentives) to urge their subscribers to change-out handsets, such programs are of limited utility and simply cannot work for roamers.

[19] The suggestion that in the *E911 Reconsideration Order* the Commission amended Section 20.18(e) to require a 125-meter RMS Phase II standard is incorrect. The Commission simply re-emphasized its earlier determination in the *First Report and Order* regarding the importance of the RMS standard and the significance of applying that standard to "*each* 911 call." E911 Reconsideration Order at ¶ 126 (emphasis in original).

The Commission adopted the 125-meter RMS standard to ensure that carriers minimize occurrences of high location inaccuracy or no location at all.[20] Under the RMS standard, less accurate measurements are weighted more heavily. Therefore, to meet an RMS standard of 125 meters, carriers must be able to minimize the number and degree of less accurate measurements. In contrast, using a 67% "circular error probability" ("CEP") standard, as SnapTrack proposes, would simply require that the "best" 67% of location attempts be within a specified accuracy level and that 33% of 911 calls need not be located with *any* degree of accuracy, or even be located at all.

In the *E911 Reconsideration Order* the Commission denied reconsideration of the RMS standard and reiterated its expectation that any Phase II ALI technology deployed by a carrier, "whether it is a network-based approach, *or any other approach*, would satisfy this requirement."[21] Despite this unequivocal Commission conclusion, the Public Notice requests comment on proposals to use different types of accuracy measurements, including CEP. There is nothing new in these proposals and they certainly do not promote public safety. CEP would simply provide that a specific percentage of a carrier's location attempts fall within a stated

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20 E911 First Report and Order at ¶¶ 70-72.

21 E911 Reconsideration Order at ¶ 126 (emphasis added).

radius. For example, a CEP of 67% and 90 meters would require that 67% of the location attempts fall within 90 meters of the respective callers' actual locations. TruePosition can already locate 67% of calls to within *85 meters* for *all* phones, not just specially equipped phones that may be available sometime in the future.[22] Thus, SnapTrack's proposed standard is not higher at all, let alone "significantly higher," than that available without granting waivers.

The E911 rules were not adopted to be fair to manufacturers or carriers, but rather to protect lives. The Commission created a standard to ensure that even in the worst case scenarios there would be adequate ALI protection. To change the standard now merely because proponents of alternative, yet unproven technologies cannot comply with the existing standard would be inexcusable. To do so would be an arbitrary abdication of the Commission's public safety responsibilities that cannot be defended on the record.[23]

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22 See TruePosition Ex Parte Presentation dated May 24, 1999, at 3.

23 An agency's decision to rescind a promulgated rule must satisfy the "arbitrary and capricious" standard of review. 5 U.S.C. § 706(2)(A). In the case of recission, however, the reviewing court imposes a heightened rationality review. This is because revocation constitutes a reversal of the agency's former views regarding policies committed to it by Congress, and goes against "a presumption that those policies will be carried out best if the settled rule is adhered to." Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Ins. Co., 463 U.S. 29, 41-42 (1983). An agency that rescinds a rule is obligated to supply a reasoned analysis "beyond that which may be required when an

(continued...)

C. The Commission Established Standards for Considering Rule Changes or Waivers, None of Which Have Been Satisfied

The Commission said in the *E911 Reconsideration Order* that it would consider waiver requests "if a covered carrier cannot comply with the Phase II requirements by October 1, 2001, despite its good faith efforts."[24] It also said it would consider changes to the E911 rules where *developed* (not potential) ALI solutions "would improve performance,"[25] and that it would consider phase-in implementation proposals principally where a proposal "helps further improvements in ALI capabilities."[26]

The *E911 Reconsideration Order*'s standards for waiving or changing the rules simply are not met. The proposals of SnapTrack, APCO and the other waiver proponents offer *no* improvements over the accuracy already demonstrated

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23 (...continued)
agency does not act in the first instance." Id. at 42. This reasoned analysis must (1) consider alternatives to recission and (2) cannot justify rescinding a rule by claiming a "substantial uncertainty" as to the rule's effectiveness without supporting evidence. Id. at 52. Lastly, an agency cannot revoke a safety standard solely because an industry has elected to employ a device that fails to comply with the promulgated standard. Id. at 49.

24 E911 Reconsideration Order at ¶ 122.

25 Id. at ¶ 129.

26 Id. at ¶ 124. The Commission's willingness to "consider reopening the record," id. at n. 319, cannot justify a disregard for earlier public interest findings that explicitly rejected the same bases for requests again under consideration. See supra note 23.

by TruePosition and other network-based E911 providers.[27] For example, SnapTrack proposes that the Commission should deem carriers in compliance with the E911 Rules if they (1) begin to deploy location-capable handsets by January 1, 2001; (2) deploy only location-capable handsets after December 31, 2001; and (3) achieve location accuracy of 90 meters using CEP methodology.[28] Even assuming that carriers can comply with each of these criteria, there is no improvement in ALI accuracy or time to implement because TruePosition and other network-based vendors can already satisfy and even exceed these milestones.

For instance, TruePosition's wireless location system can already locate more than 60 million handsets now deployed throughout the United States. TruePosition has already demonstrated through its operations in Houston (analog) and Philadelphia (TDMA) that it can locate all analog and TDMA phones to within the Phase II accuracy parameters. Such phones are used by than 60 million of the 70 million existing CMRS users today. Not only does TruePosition's system in Hous-

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[27] There is little difference between the proposals of APCO and SnapTrack, each submitted after the pleading cycle created by the December 24, 1998 Public Notice, and the various proposals submitted by several carriers on the very first comment date set up by the December 24 Public Notice. They all propose to make new GPS-capable CMRS phones available by early 2001 and most propose approximately a 90-meter accuracy standard (using non-RMS methodology).

[28] June 1 Public Notice at 3.

ton meet and exceed the Commission's 125-meter RMS accuracy standard, it also exceeds SnapTrack's proposed 90-meter CEP standard. Therefore, the Commission and public safety organizations do not have to wait to see if, come January 1, 2001 or any other selected milestone, E911 will come to fruition.[29]

APCO's proposal is substantially similar to that of SnapTrack, although APCO proposes somewhat more detailed milestones regarding the percentage of phones on a particular carrier's system that would have to be ALI-capable at particular points in time. Even by this standard, all users would not be ALI-equipped until the end of 2005, more than four years after the current deadline. Indeed, any waivers or rule changes that indefinitely defer implementation for tens of

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[29] TruePosition documented the successful deployment of its E911 location system in Houston most recently in a May 24, 1999 written *ex parte* presentation to the Bureau staff. Although SnapTrack attempts to disparage TruePosition's system, its efforts and attempts to attribute such criticisms to the cellular carrier in Houston are unavailing. See SnapTrack June 1 Ex Parte. SnapTrack claims that the carrier in Houston has announced that TruePosition's system is "unproven and would put customers at risk." Id. at 2. SnapTrack's quote, however, is not of a statement by the Houston carrier, but rather an unsupported characterization from a newspaper article attached as Exhibit A to its June 1 *ex parte* filing. In reality, the only two criticisms of the TruePosition system made by the Houston carrier, as set forth in Exhibit B to the SnapTrack June 1 Ex Parte, are that the TruePosition system currently covers only a small portion of the Houston carrier's service area and that it is not designed to locate digital, particularly TDMA, users. Although true, both SnapTrack and the Houston carrier omit that the *only reason* TruePosition has not expanded the coverage of its system or upgraded it to locate TDMA phones (as it is now doing in Philadelphia) is the Houston carrier's unwillingness to let it do so.

millions of CMRS phones cannot be in the public interest. Moreover, although APCO suggests that carriers should be required to commit to an unspecified accuracy level "substantially better than the current Phase II requirement," the proposed 90-meter CEP standard simply is *not* any "better" than the existing standard or the capability of existing network-based ALI systems.

Nor do the waiver proponents seriously address the Commission's inability to adequately enforce the waiver conditions when the proposed milestones are not met. Although APCO suggests that carriers should be subject to significant fines and license revocation, neither of those outcomes is realistic or beneficial to the accident victim who is not located because the carrier had intended to deploy an ALI technology that in the end was unavailable in time.[30]

Conclusion

There is no basis in the record to grant any of the pending waiver requests or to justify adoption of the APCO or SnapTrack proposals as amendments to the rules. Even the consideration of the pending waiver requests has already

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[30] Even APCO's proposal that carriers be required to replace, at their cost, remaining non-ALI-capable phones after a certain time is misguided. Even if a carrier could force subscribers to trade in their phones, the cost of such a program would eventually be borne by all the carrier's subscribers. This would add to the per-user cost of handset-based ALI technologies (assuming they are even workable), which TruePosition recently demonstrated would exceed that of comparable network-based ALI systems. See TruePosition Ex Parte Presentation, May 24, 1999, at 15-16.

caused nearly six months' delay in potential Phase II implementation, and pulling the E911 plug this year will undoubtedly further delay deployment. In contrast, denial of these requests will spur ALI deployment and promote the very public safety interests that the Commission has sought to protect throughout this proceeding.

Respectfully submitted,

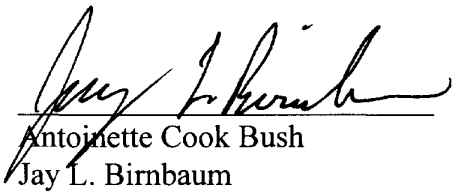

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Exhibit A

1. Introduction

The analysis in this exhibit attempts to estimate the effects, under two different scenarios, of a waiver of the October 1, 2001 Phase II deadline that would allow carriers to use handset-based ALI technologies. In particular, the analysis projects the estimated number of ALI-enabled and non-ALI-enabled handsets in use at various points in time.

The analysis in the graphs and tables is largely based on data published by Donaldson, Lufkin & Jenrette ("DLJ") in its spring 1998 annual report, "The Wireless Communications Industry." The data includes, among other things, the total number of U.S. wireless subscribers[2] and the reported or estimated annual PCS and cellular subscriber churn rates for the period 1998-2005. These are found on pages 18 and 58 of the report.

2. Results

Each assumption made in our initial analysis was favorable for handset-based technologies. For instance, we assumed that:

- All handsets sold after December 31, 2001 were ALI-enabled (i.e., all carriers adopt handset-based solutions and all manufacturers produce only ALI-enabled phones).

- Interoperability issues among competing handset-based technologies will be quickly resolved so that all ALI-enabled handsets are locatable by all handset-based technologies.

- The rate of handset churn is equal to the rate of subscriber churn (i.e., all users switching carriers buy new phones).

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[2] "Wireless subscribers" herein refers only to PCS and cellular users. The annual subscriber usage rates for SMR handsets were not available. In addition, the underlying data was available only for cellular and PCS separately. Thus, the analysis accounts for the overlap between cellular and PCS churn rates.

- All new (i.e., non-churned) subscribers buy a new phone.

- Churn rates after 2002 remain at their 2002 values.

These assumptions result in a calculation of the maximum possible number of GPS-enabled handsets in use at a given point in time. The results are presented in numerical form in Table 1 and graph form in Figure 1.

As shown in Figure 1, even under the most favorable scenario it will be years before broad handset-based coverage exists. In January 2006, more than four years after the present Phase II deadline, only 73% of the approximately 149 million wireless phones in service would be ALI-capable. Moreover, 26% of the phones – representing 39 *million* wireless subscribers – would still be unlocatable by handset-based technologies at that time. Even using these unrealistically favorable assumptions, a complete change-out of the embedded base of non-ALI handsets would not occur during any acceptably short period.

One of the most obvious flaws in this pro-handset scenario is the assumption that all phones sold after 2001 will be ALI-enabled. As discussed in detail in these comments and in the TruePosition April 29, 1999 *ex parte* at 12-14, it is highly unlikely that design, manufacturing and interoperability issues among competing handset-based ALI technologies will be quickly resolved and even more unlikely that all phones sold will be ALI-enabled. Therefore, to demonstrate the effect of delays in the availability of ALI-enabled handsets, we constructed an alternative analysis that assumed that ALI-enabled handsets would not be sold until December 31, 2002. The results are found in Table 2 and Figure 2.

Under this analysis, almost 98 million wireless subscribers, slightly less than 66% of total wireless subscribers, will be using ALI-capable phones by the end of 2005. However, at that time more than 51.5 *million* subscribers will still not be locatable by handset-based technologies.

3. Methodology

- The projections for (1) the total number of wireless subscribers/phones that would exist at the end of a given year, (2) the total number of new wireless subscribers during a given year, and (3) the wireless subscriber churn rate for a given year were taken from the DLJ report.

- The percentage of customers churned in the first year (for Figure 1, that year is 2002) was multiplied by the total number of wireless subscribers for that year. Assuming each churned subscriber also purchases a new ALI-capable phone, the resulting number represents the amount of new ALI-capable phones purchased by churned wireless subscribers.

- The number of churned wireless subscribers was then added to the number of new wireless subscribers. The resulting figure represents the total number of new ALI-capable phones purchased in a given year.

- The formula to calculate the number of new, ALI-enabled phones purchased in later years was as follows:

    - The number of ALI-enabled phones purchased by churned customers in a given year (say 2003), P_{2003}, is equal to the total number of customers churned, C_{2003}, minus those churners who already had an ALI-enabled phone (*i.e.*, users who purchased a new phone in 2002). If this group were not subtracted, they would be double-counted.
    So: $P_{2003} = C_{2003} - N_{2002/2003}$
    $N_{2002/2003} = \%churned_{pcs} \times \#churned_{pcs} + \%churned_{cell} \times \#churned_{cell}$

For example, there will be approximately 76.4 million cellular (excluding PCS and SMR) users at the beginning of the 2001. By multiplying the total number of cellular users by the 25.63% percent annual churn rate, we project that 19.583 million customers will churn by the end of 2001 (76.40 x .2563 = 19.583). Of that 19.583 million customers, 30% will have switched to PCS. The remaining 70% or 13.708 million subscribers will have actually purchased new cellular phones (19.583 x .70 = 13.708). We then add the 5 million new cellular subscribers to 13.708 million for a sum total of 15.708 million new cellular phones purchased in 2001. We then performed the same analysis for PCS subscribers, and totaled the cellular and PCS figures to derive the total wireless subscriber figures. Finally, by using our formula to calculate the percentage of new phones purchased, we calculated that by the end of 2002, at best 32.83%t of total wireless subscribers could have GPS-capable phones (assuming all new phones were GPS-equipped). By 2003, the percentage increases to 55.08%, and by 2004, 68.10% of wireless subscribers will have GPS-capable phones. Note again that this excludes SMR subscribers.

Figure 1

Number of Non-GPS Handsets in Use
If GPS Handsets Are Available at the End of 2001

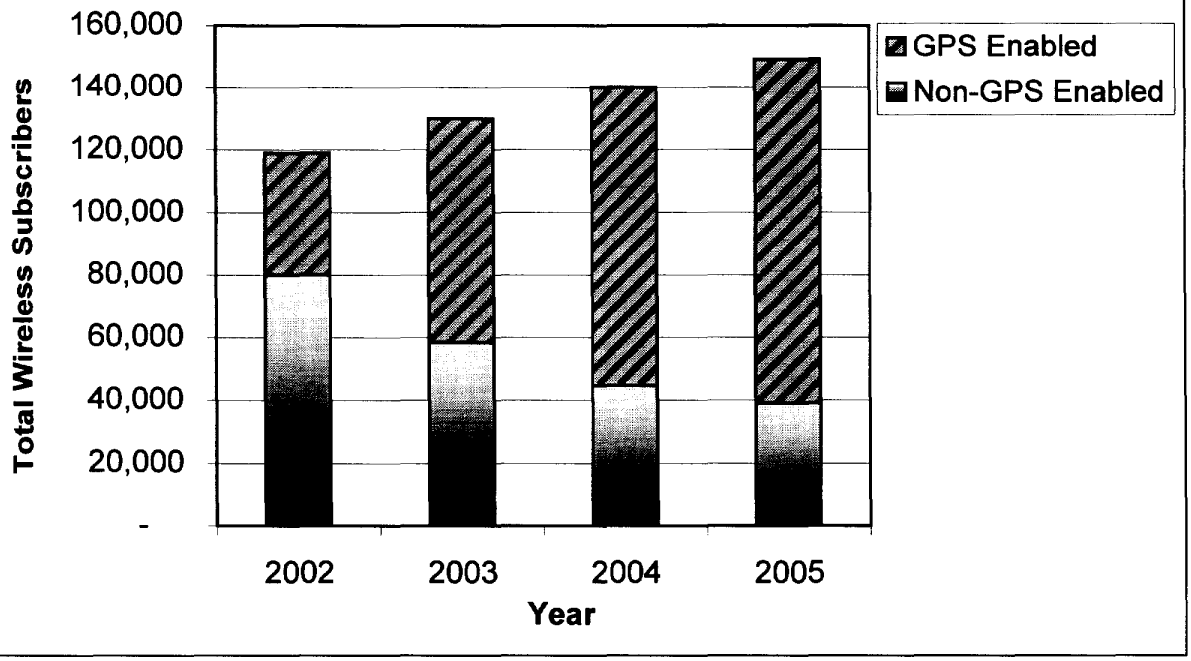

Table 1

Wireless Data		all data as of end of year			
Item	**Item #**	**2002**	**2003**	**2004**	**2005**
Wireless subscribers	1	119,000	130,000	140,000	149,000
Net New Additions	2	12,000	11000	10,000	9,000
PCS Subscribers	3	38,600	46,100	53,100	59,400
Net New Adds- PCS		8,000	7,000	6,300	6,300
Cellular Subscribers	4	80,400	*83,900*	86,900	89,600
Net New Adds- Cellular	4a	4,000	3,000	2,700	2,700
Cellular Churn	5	16,643	17,367	17,988	18,547
Cellular Churn %	5a	20.70%	20.70%	20.70%	20.70%
PCS Churn	6	13,896	16,596	19,116	21,384
PCS Churn %	6a	36.00%	36.00%	36.00%	36.00%
Cellular lost to PCS%	7	20.00%	20.00%	20.00%	20.00%
PCS lost to Cellular %	8	1.00%	1.00%	1.00%	1.00%
New phones from churn (Cell)	9	13,314	13,894	14,391	14,838
New Phones from churn (PCS)	11	13,757	16,430	18,925	21,170
Total New Phones from Churn (9+11)		***27,071***	***30,324***	***33,315***	***36,008***
Total New Phones Sales (Cell)	10	17,314	16,894	17,091	17,538
Total New Phones Sales (PCS)	12	21,757	23,430	25,225	27,470
Total New Phones Sales(10+12)		***39,071***	***40,324***	***42,315***	***45,008***

SUMMARY DATA		2002	2003	2004	2005
Total Wireless Phones in Use	(A)	119,000	130,000	140,000	149,000
Total New Phones Sales-Cell	(B)	17,314	16,894	17,091	17,538
Total New Phones Sales-PCS	(C)	21,757	23,430	25,225	27,470
Total New Phone Sales (B+C)	*(D)*	*39,071*	*40,324*	*42,315*	*45,008*
New Additions	(E)	12,000	11,000	10,000	9,000
Total New Phone Sales - New Additions (D-E)	*(F)*	*27,071*	*29,324*	*32,315*	*36,008*
Total New from Churn	(G)	27,071	30,324	33,315	36,008
of (G) above, # swithching from GPS to GPS *= % churned x new from churn (Cell & PCS)*	(H)		8,791	19,584	30,384
Number of GPS-enabled phones from Churn	(I)	27,071	21,533	13,732	5,624
Total New GPS-enabled this year *=# of GPS+ New Additions*	(E+I)	39,071	32,533	23,732	14,624
Total GPS-Enabled Phones Since 2001	(K)	39,071	71,604	95,336	109,959
Total non-GPS-Enabled Phones	(L)	79,929	58,396	44,664	39,041
% of Post-2001 Phones	(N)	**32.83%**	**55.08%**	**68.10%**	**73.80%**

Figure 2

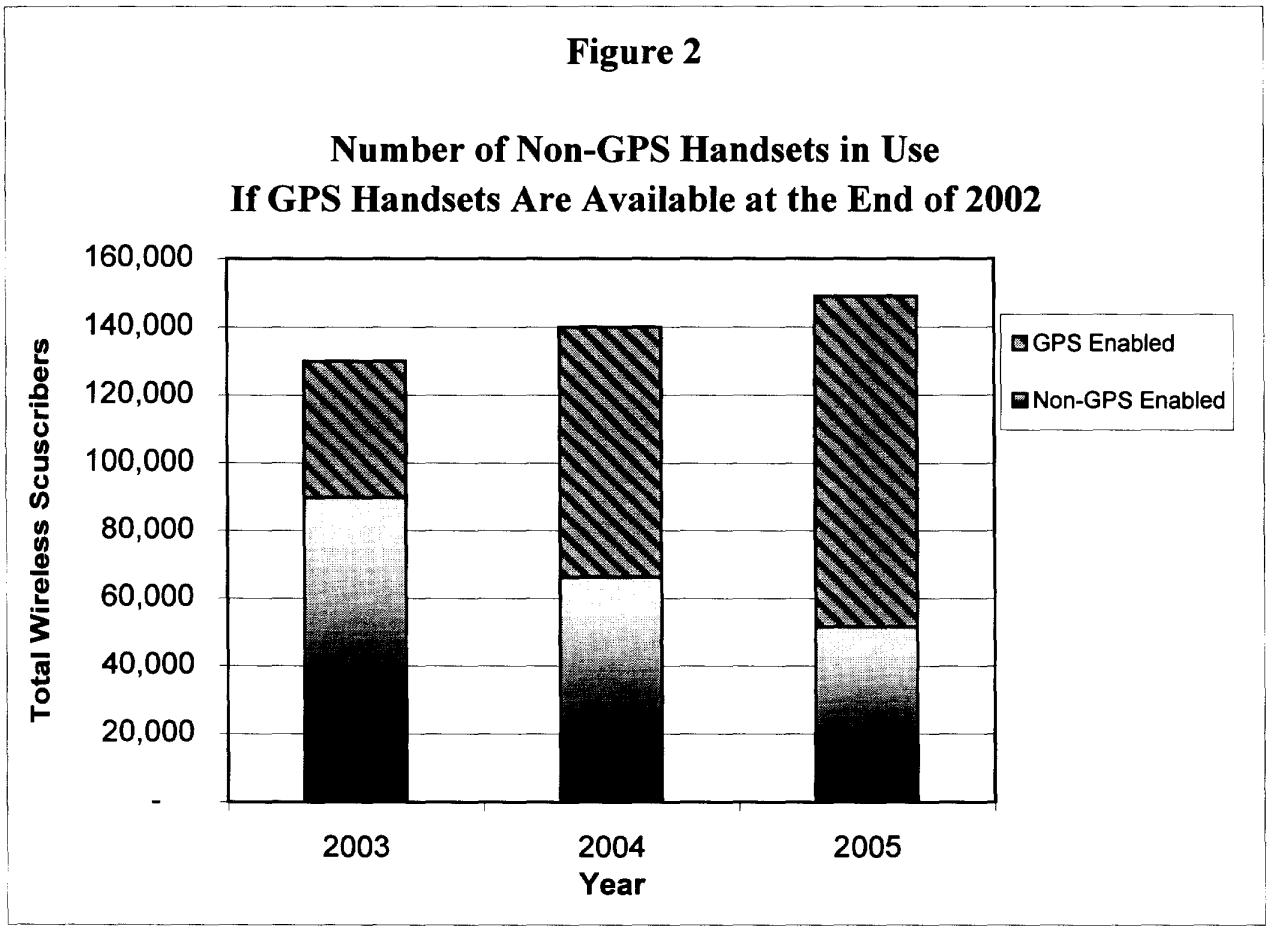
Number of Non-GPS Handsets in Use
If GPS Handsets Are Available at the End of 2002
Total Wireless Scuscribers
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
-
2003
2004
2005
Year
GPS Enabled
Non-GPS Enabled

Table 2

Wireless Data				all data as of end of year
Item	**Item #**	**2003**	**2004**	**2005**
Wireless subscribers	1	130,000	140,000	149,000
Net New Additions	2	11,000	10,000	9,000
PCS Subscribers	3	46,100	53,100	59,400
Net New Adds- PCS		7,000	6,300	6,300
Cellular Subscribers	4	83,900	86,900	89,600
Net New Adds- Cellular	4a	3,000	2,700	2,700
Cellular Churn	5	17,367	17,988	18,547
Cellular Churn %	5a	20.70%	20.70%	20.70%
PCS Churn	6	16,596	19,116	21,384
PCS Churn %	6a	36.00%	36.00%	36.00%
Cellular lost to PCS%	7	20.00%	20.00%	20.00%
PCS lost to Cellular %	8	1.00%	1.00%	1.00%
New phones from churn (Cell)	9	13,894	14,391	14,838
New Phones from churn (PCS)	11	16,430	18,925	21,170
Total New Phones from Churn (9+11)		***30,324***	***33,315***	***36,008***
Total New Phones Sales (Cell)	10	16,894	17,091	17,538
Total New Phones Sales (PCS)	12	23,430	25,225	27,470
Total New Phones Sales(10+12)		***40,324***	***42,315***	***45,008***

SUMMARY DATA		2003	2004	2005
Total Wireless Phones in Use	(A)	130,000	140,000	149,000
Total New Phones Sales-Cell	(B)	16,894	17,091	17,538
Total New Phones Sales-PCS	(C)	23,430	25,225	27,470
Total New Phone Sales (B+C)	*(D)*	*40,324*	*42,315*	45,008
New Additions	(E)	11,000	10,000	9,000
Total New Phone Sales - New Additions (D-E)	*(F)*	*29,324*	*32,315*	*36,008*
Total New from Churn	(G)	30,324	33,315	36,008
of (G) above, # swithching from GPS to GPS *= % churned x new from churn (Cell & PCS)*	(H)		9,792	21,385
Number of GPS-enabled phones from Churn	(I)	30,324	23,524	14,623
Total New GPS-enabled this year *=# of GPS+ New Additions*	(E+I)	41,324	33,524	23,623
Total GPS-Enabled Phones Since 2002		40,324	73,848	97,470
Total non-GPS-Enabled Phones	(L)	89,676	66,152	51,530
% of Post-2002 Phones		31.02%	52.75%	65.42%

CERTIFICATE OF SERVICE

This is to certify that the attached document has been served on this 17th day of June 1999 on the following:

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